



Is splash erosion potential species specific? Measuring of splash erosion potential under forest in different succession stages along a biodiversity gradient in the humid subtropics

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It is widely accepted that (forest) vegetation is a key control for the type and intensity of soil erosion. The current paradigm is that natural or quasi-natural vegetation protects the soil from erosion and that agricultural vegetation or land use generally enhances erosion. The latter was in focus of most research during the last decades and less interest was paid on natural systems, which are more difficult to study. Nevertheless, afforestation is widely used as a measure of soil protection against soil erosion. Rainfall can be highly erosive particularly in the humid subtropics. Regarding climate change, also precipitation regime may change in direction to even more severe storms and higher rainfall intensities; it is a research field of growing importance. Key mechanisms of a vegetation cover in reducing or enhancing erosion are modifications of drop-size distribution, retention of raindrop impact on the soil and changes in amount and spatial distribution of rainfall at the ground surface. Controlling determinants are rainfall intensity, drop size distribution, drop fall velocity, height of the canopy as well as density of the canopy, crown and leaf traits, LAI and coverage by a litter layer. Large drops are supposed to be significant sources of splash detachment in forests (Brandt 1989; Vis 1986). However, the mechanisms of reducing (or enhancing?) splash detachment under forest in relation to species richness and species composition are not well understood. Some studies indicate that raindrop impact is species specific (Calder 2001; Nanko et al. 2006) and some neglect the effects of species specific impacts (Foot & Morgan 2005).

Our research uses different methods of rainfall characterization (splash cups, tipping-bucket rain gauge, laser distrometer) to reveal the described mechanisms from the canopy through different vegetation layers to the ground. First results of splash cup measurements (revised after Ellison 1947) show that sand loss under vegetation is 2.5 times higher than in open field despite the fact that only 60 percent of open field rainfall reaches the ground. The results also indicate that sand loss is a function of the age of the specific forest stand and the variability of sand loss under different species with respect to space and time. These and future results will help managing afforestation projects in giving implications which of the species (resp. species compositions) may reduce most effectively potential splash erosion.

References:

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